# ARC 1171C

# EDUCATIONAL EXAMINERS BOARD[282]

**Adopted and Filed**

Pursuant to the authority of Iowa Code section 272.2, the Board of Educational Examiners hereby amends Chapter 13, "Issuance of Teacher Licenses and Endorsements," and Chapter 17, "Career and Technical Endorsements and Licenses," Iowa Administrative Code.

In December 2012, a licensure subcommittee of the Governor's STEM Advisory Council, consisting of science, math, and industrial technology practitioners and administrators as well as higher education, Department of Education, and Board of Educational Examiners representatives, met to recommend licensure rules to support implementation of Iowa's Science, Technology, Engineering, and Mathematics (STEM) initiative. The STEM initiative is based on Executive Order 74, signed by Governor Branstad on July 26, 2011. The subcommittee recommended these amendments, which create K-8 and 5-8 STEM endorsements, a K-12 STEM specialist, a career and technical license for engineering, and a 5-12 engineering endorsement.

Notice of Intended Action was published in the Iowa Administrative Bulletin as **ARC 0993C** on September 4, 2013.

A public hearing was held on September 25, 2013, with written comment accepted until 4 p.m. on September 27, 2013. No one attended the public hearing, and no written comments were received.

There is one change to the amendments published under Notice. The word "coach" was removed from the catchwords of paragraph 13.28(32)"c" to avoid confusion with the implementation of Teacher Leadership and Compensation frameworks.

After analysis and review of this rule making, there is no anticipated impact on jobs.

These amendments are intended to implement Iowa Code section 272.2(1)"a."

These amendments will become effective December 18, 2013.

The following amendments are adopted.

ITEM 1. Adopt the following **new** subrule 13.28(31):

**13.28(31)** *Engineering.* 5-12.

*a.* Completion of 24 semester hours in engineering coursework.

*b.* Methods and strategies of STEM instruction or methods of teaching science or mathematics.

ITEM 2. Adopt the following **new** subrule 13.28(32):

**13.28(32)** *STEM.*

*a. K-8.*

(1) Authorization. The holder of this endorsement is authorized to teach science, mathematics, and integrated STEM courses in kindergarten through grade eight.

(2) Program requirements. Be the holder of the teacher—elementary classroom endorsement.

(3) Content.

1. Completion of a minimum of 12 semester hours of college-level science.

2. Completion of a minimum of 12 semester hours of college-level math (or the completion of Calculus I) to include coursework in computer programming.

3. Completion of a minimum of 3 semester hours of coursework in content or pedagogy of engineering and technological design that includes engineering design processes or programming logic and problem-solving models and that may be met through either of the following:

- Engineering and technological design courses for education majors;
- Technology or engineering content coursework.

4. Completion of a minimum of 6 semester hours of required coursework in STEM curriculum and methods to include the following essential concepts and skills:

- Comparing and contrasting the nature and goals of each of the STEM disciplines;
- Promoting learning through purposeful, authentic, real-world connections;
- Integration of content and context of each of the STEM disciplines;

- Interdisciplinary/transdisciplinary approaches to teaching (including but not limited to problem-based learning and project-based learning);
- Curriculum and standards mapping;
- Engaging subject-matter experts (including but not limited to colleagues, parents, higher education faculty/students, business partners, and informal education agencies) in STEM experiences in and out of the classroom;
- Assessment of integrative learning approaches;
- Information literacy skills in STEM;
- Processes of science and scientific inquiry;
- Mathematical problem-solving models;
- Communicating to a variety of audiences;
- Classroom management in project-based classrooms;
- Instructional strategies for the inclusive classroom;
- Computational thinking;
- Mathematical and technological modeling.

5. Completion of a STEM field experience of a minimum of 30 contact hours that may be met through the following:
- Completing a STEM research experience;
- Participating in a STEM internship at a STEM business or informal education organization; or
- Leading a STEM extracurricular activity.

*b. 5-8.*

(1) Authorization. The holder of this endorsement is authorized to teach science, mathematics, and integrated STEM courses in grades five through eight.

(2) Program requirements. Be the holder of a 5-12 science, mathematics, or industrial technology endorsement or 5-8 middle school mathematics or science endorsement.

(3) Content.

1. Completion of a minimum of 12 semester hours of college-level science.

2. Completion of a minimum of 12 semester hours of college-level math (or the completion of Calculus I) to include coursework in computer programming.

3. Completion of a minimum of 3 semester hours of coursework in content or pedagogy of engineering and technological design that includes engineering design processes or programming logic and problem-solving models and that may be met through either of the following:
- Engineering and technological design courses for education majors;
- Technology or engineering content coursework.

4. Completion of a minimum of 6 semester hours of required coursework in STEM curriculum and methods to include the following essential concepts and skills:
- Comparing and contrasting the nature and goals of each of the STEM disciplines;
- Promoting learning through purposeful, authentic, real-world connections;
- Integration of content and context of each of the STEM disciplines;
- Interdisciplinary/transdisciplinary approaches to teaching (including but not limited to problem-based learning and project-based learning);
- Curriculum and standards mapping;
- Engaging subject-matter experts (including but not limited to colleagues, parents, higher education faculty/students, business partners, and informal education agencies) in STEM experiences in and out of the classroom;
- Assessment of integrative learning approaches;
- Information literacy skills in STEM;
- Processes of science and scientific inquiry;
- Mathematical problem-solving models;
- Communicating to a variety of audiences;
- Classroom management in project-based classrooms;
- Instructional strategies for the inclusive classroom;

- Computational thinking;
- Mathematical and technological modeling.

5. Completion of a STEM field experience of a minimum of 30 contact hours that may be met through the following:

- Completing a STEM research experience;
- Participating in a STEM internship at a STEM business or informal education organization; or
- Leading a STEM extracurricular activity.

*c. Specialist K-12.*

(1) Authorization. The holder of this endorsement is authorized to serve as a STEM specialist in kindergarten and grades one through twelve.

(2) Program requirements.

1. The applicant must have met the requirements for a standard Iowa teaching license and a teaching endorsement in mathematics, science, engineering, industrial technology, or agriculture.

2. The applicant must hold a master's degree from a regionally accredited institution. The master's degree must be in math, science, engineering or technology or another area with at least 12 hours of college-level science and at least 12 hours of college-level math (or completion of Calculus I) to include coursework in computer programming.

(3) Content.

1. Completion of a minimum of 3 semester hours of coursework in content or pedagogy of engineering and technological design that includes engineering design processes or programming logic and problem-solving models and that may be met through either of the following:

- Engineering and technological design courses for education majors;
- Technology or engineering content coursework.

2. Completion of 9 semester hours in professional development to include the following essential concepts and skills:

- STEM curriculum and methods:

- Comparing and contrasting the nature and goals of each of the STEM disciplines;
- Promoting learning through purposeful, authentic, real-world connections;
- Integration of content and context of each of the STEM disciplines;
- Interdisciplinary/transdisciplinary approaches to teaching (including but not limited to problem-based learning and project-based learning);
- Curriculum/standards mapping;
- Assessment of integrative learning approaches;
- Information literacy skills in STEM;
- Processes of science/scientific inquiry;
- Mathematical problem-solving models;
- Classroom management in project-based classrooms;
- Instructional strategies for the inclusive classroom;
- Computational thinking;
- Mathematical and technological modeling.

- STEM experiential learning:

- Engaging subject-matter experts (including but not limited to colleagues, parents, higher education faculty/students, business partners, and informal education agencies) in STEM experiences in and out of the classroom;
- STEM research experiences;
- STEM internship at a STEM business or informal education organization;
- STEM extracurricular activity;
- Communicating to a variety of audiences.

- Leadership in STEM:

- STEM curriculum development and assessment;
- Curriculum mapping;
- Assessment of student engagement;

- STEM across the curriculum;
- Research on best practices in STEM;
- STEM curriculum accessibility for all students.

3. Completion of an internship/externship professional experience or prior professional experience in STEM for a minimum of 90 contact hours.

ITEM 3. Adopt the following **new** paragraph **17.1(3)"c"**:

*c. Engineering.*

(1) Completion of a baccalaureate degree in engineering.

(2) Demonstrated career and technical competence in engineering by completion of a minimum of 4,000 hours of practical, hands-on experience in engineering.

(3) Coursework in foundations of career and technical education, planning and implementing courses and curriculum, methods and strategies of STEM instruction, and assessment of STEM programs and students.

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EDITOR'S NOTE: For replacement pages for IAC, see IAC Supplement 11/13/13.